TYPE-CERTIFICATE DATA SHEET

No. E.064

for
Spey 500 Series Engines

Type Certificate Holder
Rolls-Royce Deutschland Ltd & Co KG

Eschenweg 11, Dahlewitz
15827 Blankenfelde-Mahlow
Germany

For Models:
Spey 511-8
Spey 511-14
Spey 555-15
Spey 555-15H
Spey 555-15N
Spey 555-15P

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I. General

1. Type/ Model

Spey 500 / Spey 511-8, Spey 511-14, Spey 555-15, Spey 555-15H, Spey 555-15N, Spey 555-15P

These variants are approved for use on multi-engined civil aircraft at the ratings and within the operating limitations specified below, subject to compliance with the powerplant installation requirements appropriate to approved installations.

2. Type Certificate Holder

Rolls-Royce Deutschland Ltd & Co KG
(formerly Rolls-Royce Deutschland GmbH, formerly BMW Rolls-Royce GmbH)
Eschenweg 11, Dahlewitz
15827 Blankenfelde-Mahlow
Germany

EASA Design Organisation Approval No: EASA.21J.065.

3. Manufacturer

Rolls-Royce plc
P.O. Box 31
Derby, DE24 8BJ
United Kingdom

4. Date of Application

Not known (before 15 June 1966).

5. EASA Type Certification Date

Spey 511-8	01 February 1969
Spey 511-14	23 May 1966
Spey 555-15	22 February 1968
Spey 555-15H	24 December 1974
Spey 555-15N	23 February 1981
Spey 555-15P	23 February 1981

II. Certification Basis

1. State of Design Authority Certification Basis

Refer to item II.3.

2. Reference Date for determining the applicable airworthiness requirements

Not identified (before 1 June 1966).

3. EASA Certification Basis

3.1. Airworthiness Standards

Spey 511-8 and Spey 511 -14
BCAR Section C, issue 5 dated 1 July 1962.

Spey 555-15; Spey 555-15H; Spey 555-15N and Spey 555-15P
BCAR Section C, issue 6 dated 15 June 1966.

3.2. Special Conditions (SC)

None

3.3. Equivalent Safety Findings

None

3.4. Deviations

None

3.5. Environmental Protection

Not identified for Fuel Venting and Emissions (before 1 June 1966).

III. Technical Characteristics

1. Type Design Definition

The Engine Type Designs are defined in the following Drawing Introduction Sheets (DIS):

Spey 511-8	Spey 511-14	Spey 555-15
DIS No. 874 issue 2 or later approved issues	DIS No. 862 issue 2 or later approved issues	DIS No. 912 issue 2 or later approved issues

Spey 555-15H	Spey 555-15N	Spey 555-15P
DIS No. 1015 Issue 1 or later approved issues	DIS No. 2004 Issue 1 or later approved issues	DIS No. 2005 Issue 1 or later approved issues

Changes to the Engine Type Design are introduced by approved Modification Bulletins.

2. Description

Spey 511-8	Spey 511-14
By-pass Ratio 0.64 : 1	
By-pass turbo-jet engine consisting of one five-stage axial flow low pressure (LP) compressor and one twelve-stage axial flow high pressure (HP) compressor. The HP-compressor is driven by a two-stage axial flow HP-turbine and the LP compressor is driven by a two-stage axial flow LP-turbine. The annular combustion chamber contains 10 straight flow flame tubes.	

Spey 555-15	Spey 555-15H	Spey 555-15N	Spey 555-15P
By-pass Ratio 1,015 : 1at 99,8% HP rpm		By-pass Ratio 1,011 : 1at 100% HP rpm	
By-pass turbo-jet engine consisting of one five-stage axial flow low pressure (LP) compressor and one twelve-stage axial flow high pressure (HP) compressor. The HP-compressor is driven by a two-stage axial flow HP-turbine and the LP compressor is driven by a two-stage axial flow LP-turbine. The annular combustion chamber contains 10 straight flow flame tubes.			

3. Equipment

For identification of engine driven equipment refer to the Overhaul Manual:

Spey 511-8	Spey 511-14
O-Sp4-G	O-Sp4-B

Spey 555-15	Spey 555-15H	Spey 555-15N	Spey 555-15P
O-Sp2-F			

For details of equipment included in the type design definition: refer to the appropriate engine DIS.

4. Dimensions

	Spey 511-8	Spey 511-14
Overall Length (1)	2910 mm	
Overall Diameter	893 mm	

	Spey 555-15	Spey 555-15H	Spey 555-15N	Spey 555-15P
Overall Length (1)	2599 mm		2676 mm	
Overall Diameter	1008 mm			

(1) with exhaust cone

5. Dry Weight

	Spey 511-8	Spey 511-14
Dry engine weight	1048.7kg ± 1.25%	

	Spey 555-15	Spey 555-15H	Spey 555-15N	Spey 555-15P
Dry engine weight	1007.9 kg	1019.2 kg	1015.2 kg	1024 kg

6. Ratings

	Spey 511-8	Spey 511-14
Max Take off Thrust	50.71 kN	
Maximum Continuous	48.66 kN	

	Spey 555-15	Spey 555-15H	Spey 555-15P	Spey 555-15N
Max Take off Thrust	43.81 kN	44.04 kN		43.82 kN
Maximum Continuous	42.12 kN	42.35 kN		42.13 kN

7. Control System

The engine is equipped with a Full Authority Digital Engine Control (FADEC) system.

	Spey 511-8	Spey 511-14
CASC	Lucas CASC 116 or 146 (hydromechanical) or later approved standards	Lucas CASC 112 (hydromechanical) or later approved standards

	Spey 555-15	Spey 555-15N	Spey 555-15H	Spey 555-15P
CASC	Lucas CASC 133 (hydromech.), or later approved standards		Lucas CASC 211 (hydromech.), or later approved standards	

8. Fluids (Fuel, Oil, Coolant, Additives):

Approved fuels, additives and oils are listed in:

	Spey 511-8	Spey 511-14
Operating Instructions	F-Sp4-G	F-Sp4-BK

	Spey 555-15	Spey 555-15H	Spey 555-15N	Spey 555-15P
Operating Instructions	F-Sp2-F			

9. Aircraft Accessory Drives:

Refer to aircraft related manuals or approved data.

10. Maximum Permissible Air Bleed Extraction:

Refer to item IV.3.3.

IV. Operating Limitations

1. Temperature Limits

Gas Temperatures TGT (trimmed)(1):

	Spey 511-8	Spey 511-14
Max during Starting on ground	570 °C	
Max during relight (2 sec. limit)	570 °C	
Max for Take-off (5 min.)	585 °C	580 °C
Maximum Continuous	540 °C	
Maximum for approach & Ground idling	540 °C	
Maximum with reverse Thrust selected (30 sec. limit)	580 °C	
Maximum Overtemperature (20 sec.)	610 °C 615 °C **(2)**	595 °C
Momentary maximum during acceleration	595 °C **(2)**	N/A

The following operating limitations are applicable when the accuracy of the installed engine instrumentation is in accordance with Rolls-Royce Report APS 1014.

The engines are approved for use up to ISA +35°C. The engine is flat rated for Takeoff Rating to ISA +7.5°C

Gas Temperatures TGT (trimmed) (3):

	Spey 555-15	Spey 555-15N	Spey 555-15H	Spey 555-15P
Maximum during starting on ground	540 °C		570 °C	
Maximum during relight (2 sec. Limit)	540 °C		570 °C	
Maximum for Take-off **(4)**	520 °C		565 °C	
Maximum Continuous	490 °C		520 °C	
Maximum for ground idling	490 °C		520 °C	
Maximum overtemperature (20 sec. limit)	540 °C		585 °C	

(1)
Mean of 10 Thermocouples located in the engine exhaust cone, trimmed electrically to a common TGT datum, i.e. Indicated TGT (°C) = Measured TGT (°C) – P.D. (°C), where P.D. = Pull Down in °C due to trimmer resistor value.

(2)
For Spey 511-8 engines incorporating HP stage 1 turbine blades to MOD 2970 standard or an approved equivalent standard as listed in Rolls-Royce Service Bulletin SP 77-43, the engine name plate shall be marked with the inscription ‘SB SP 77-43’.

(3)
Mean of 10 Thermocouples located in the engine exhaust unit with trimmer resistors and compensation for air intake temperature in accordance with the following nominal characteristics:
Indicated EGT (°C) = Measured EGT (°C) – P.D. (°C) – (0.28 x T (°C)), where P.D. (°C) = pull down due to trimmer resistors and T (°C) = intake total temperature.

(4)
Limited to 5 minutes and to max. 10 minutes after one engine having failed.

Fuel Temperatures:

	Spey 511-8	Spey 511-14
Max at Inlet to Engine	50 °C	
LP Pump Inlet, maximum • Unrestricted • 15 min. limit **(5)**	90 °C 110 °C	

	Spey 555-15	Spey 555-15H	Spey 555-15N	Spey 555-15P
Max at Inlet to Engine	50 °C			
LP Pump Inlet, maximum • Unrestricted • 15 min. limit **(5)**	90 °C 110 °C			

(5) During transient overshoots on reducing rpm.

Oil Temperatures:

	Spey 511-8	Spey 511-14
Minimum for starting	-40 °C	
Minimum for acceleration to Take-off	-30 °C	
Maximum unrestricted	100 °C	
Maximum (15 min. limit)	120 °C	

	Spey 555-15	Spey 555-15H	Spey 555-15N	Spey 555-15P	Spey 555-15	Spey 555-15H	Spey 555-15N	Spey 555-15P
	without MOD 6089				with MOD 6089			
Minimum for starting	- 40 °C				-30 °C			
Minimum for acceleration to Take-off	-30 °C							
Maximum unrestricted	100 °C							
Maximum (15 min. limit)	120 °C							

2. Speed Limits

Permissible Rotational Speeds [min-1]:

100 % LP RPM = 8393 RPM

Low Pressure Turbine	Spey 511-8	Spey 511-14
Maximum Take-off	8947 RPM **(6)** *(106.6 %)*	
Maximum Continuous	8947 RPM *(106.6 %)*	
Maximum Overspeed (20 sec.)	9232 RPM *(110.0 %)*	
Reverse Thrust (maximum 30 sec.)	8947 RPM *(106.6 %)*	

(6) Wet and Dry (Spey 511-14W only).

100 % HP RPM = 12484 RPM

High Pressure Turbine	Spey 511-8	Spey 511-14
Maximum Take-off RPM	12496 **(7)** *(100.1 %)*	
Maximum Continuous RPM	12247 *(98.1 %)*	
Ground Idling RPM	6492 – 6929 (*52.0% to 55.5%)*	7241 - 7990 *(58.0% - 64.0 %)*
Maximum Overspeed RPM (20 sec.)	12871 *(103.1%)*	
Reverse Thrust RPM (maximum 30 sec.)	12496 *(100.1 %)*	

(7) Dry (All Spey 511).

100 % LP RPM = 8393 RPM

Low Pressure Turbine	Spey 555-15	Spey 555-15N	Spey 555-15H	Spey 555-15P
Maximum Take-off	9106 RPM *(108.5%)*		9190 RPM *(109.5 %)*	
Maximum Continuous			9106 RPM *(108.5%)*	
Maximum Overspeed (20 sec.)	9694 RPM *(115.5%)*			

100 % HP RPM = 12136 RPM

High Pressure Turbine	Spey 555-15	Spey 555-15N	Spey 555-15H	Spey 555-15P
Maximum Take-off	12257 RPM *(101.0 %)*		12439 RPM *(102.5 %)*	
Maximum Continuous	11954 RPM *(98.5 %)*			
Ground Idling	6250 RPM ± 61 RPM *(51.5% ± 0.5%)*			
Maximum Overspeed (20 sec.)	12682 RPM *(104.5%)*		12803 RPM *(105.5 %)*	

3. Pressure Limits

3.1 Fuel Pressure:

	Spey 511-8	Spey 511-14
Minimum at LP Pump Inlet • absolute	82.7 kPa	
• above tank pressure	41.4 kPa	

	Spey 555-15	Spey 555-15H	Spey 555-15N	Spey 555-15P
Minimum at LP Pump Inlet • absolute	82.7 kPa			
• above tank pressure	41.4 kPa			

Whichever is lower, subject to an overriding minimum of 13.8 kPa gauge pressure, and excluding engine starts on the ground for which the minimum pressure requirement normally is 69 kPa absolute.

3.2 Oil Pressure:

Refer to item IV.4.

3.3 Bleed Air Extraction:

The compressor air bleeds are to be used in accordance with Rolls-Royce instructions and such that the operating limitations are not exceeded.

		Spey 511-8	Spey 511-14
Maximum RPM at which bleed may be used:		Unrestricted	
Air delivery at sea level for aircraft and engine services (% of no-bleed mass flow)	Maximum LP Bleed	3.65 %	
	Maximum HP Bleed	2.45 %	

			Spey 555-15	Spey 555-15H	Spey 555-15N	Spey 555-15P
Maximum RPM at which bleed may be used:			Unrestricted			
Air delivery at sea level for aircraft and engine services (% of no-bleed mass flow) M12= Stage 12 bleed M=LP bleed mass flow T1= LPC inlet TAT P1= LPC inlet TTP	$\frac{M_{12}\sqrt{T_1}}{P_1} =$	Take Off	0.42			
		MCT and below	0.41			
	M7 = Stage 7 bleed mass flow (kg/sec) $\frac{M_7\sqrt{T_1}}{P_1} =$	Take Off	0.49			
		MCT and below	0.45			
	MT = M7+ M12 (kg/sec) $\frac{M_T\sqrt{T_1}}{P_1} =$	Take Off	0.91			
		MCT and below	0.86			

4. Oil capacity, consumption limit

	Spey 511-8	Spey 511-14
Oil Consumption : • Overall in flight, maximum for unrestricted operation	0.43 l/h	
Oil Pressure (gauge pressure) • Normal at max. continuous conditions	275.8 to 379.2 kPa	241.3 - 379.2 kPa
Oil Pressure (gauge pressure) • Minimum to complete flight (at 100° C Oil Temperature)	241.3 kPa	206.9 kPa
Oil System Capacity: • Nominal total oil system	13.6 l	
• Maximum oil sump and tanks capacity	6.8 l	
• Usable oil	5.1 l	

	Spey 555-15	Spey 555-15H	Spey 555-15N	Spey 555-15P
Oil Consumption : • Overall in flight, maximum for unrestricted operation	0.43 l/h			
Oil Pressure (gauge pressure) • Normal at max. continuous conditions	206.9 – 379.2 kPa			
Oil Pressure (gauge pressure) • Minimum to complete flight (at 100° C Oil Temperature)	172.4 kPa			
Oil System Capacity: • Nominal total oil system	13.6 l			
• Maximum oil sump and tanks capacity	6.8 l			
• Usable oil	5.1 l			

V. Operating and Service Instructions

	Spey 511-8	Spey 511-14
Installation Manual	EL 17 (*)	
Operating Instructions	F-Sp4-G (*)	F-Sp4-BK (*)
Maintenance Manual	M-Sp4-G (*)	M-Sp4-BK (*)
Overhaul Manual	O-Sp4-G (*)	O-Sp4-B (*)
Time Limits Manual	O-Sp4-G (*)	O-Sp4-B (*)
Service Bulletins	As issued by Rolls-Royce Deutschland Ltd & Co KG	

	Spey 555-15	Spey 555-15H	Spey 555-15N	Spey 555-15P
Installation Manual	EL 1001 (*)			
Operating Instructions	F-Sp2-F (*)			
Maintenance Manual	M-Sp2-F (*)			
Overhaul Manual	O-Sp2-F (*)			
Time Limits Manual	Life Limited Parts are listed in the Overhaul Manual O-Sp2-F (*)			
Service Bulletins	As issued by Rolls-Royce Deutschland Ltd & Co KG			

(*):or later approved revision

VI. Notes

1. The ratings shown under III.6. are static ratings achieved at the following conditions:
   - Sea level and ISA standard day conditions
   - All optional air bleeds closed
   - Aircraft service accessory drives unloaded
   - Rolls-Royce Test Bed Airmeter P/N: REP 23224
   - Rolls-Royce Jet Pipe P/N J88926 (or approved equivalent)
   - Final nozzle P/N J88931
   - Turbine gas temperature measured by 10 thermocouples located in exhaust cone, without compensation for air intake temperature.
   - Fuel having a minimum calorific value of 40895 BTU/kg

2. Engine anti-icing is affected by hot air tapped from the HP compressor.

3. LP rotor run-down time (from ground idling): Minimum 40 sec.

4. Following a false start, an engine motor over is to be completed prior to repeating the start operation.

5. Spey 511-8, 511-14 engines were previously covered under CAA-UK Type Certificate Data Sheet No.: 1032 and were subsequently covered under LBA Type Certificate Data Sheet No.: 6308.
   Spey 555-15, 555-15H, 555-15N, 555-15P engines were previously covered under CAA-UK Type Certificate Data Sheet No.: 1037 and were subsequently covered under LBA Type Certificate Data Sheet No.: 6347.
   The EASA Type Certificate EASA.E.064 and this Type Certificate Data Sheet supersede all of these.

6. With effect from 7 January 2002, the responsibilities of the Type Certificate Holder for the Spey 500 series engines transferred from Rolls-Royce plc to Rolls-Royce Deutschland Ltd & Co KG. Coincident with this the ICAO Annex 8 responsibilities of the Authority of the State of Design transferred from the United Kingdom Civil Aviation Authority (CAA-UK) to the German Luftfahrt-Bundesamt (LBA).
   The EASA Type Certificate EASA.E.064 transfers the Authority of the State of Design from the German Luftfahrt-Bundesamt (LBA) to EASA.
   Airworthiness Directives issued prior and after the time of the transfers of the State of Design are still effective.

SECTION: ADMINISTRATIVE

I. Acronyms and Abbreviations

N/A

II. Type Certificate Holder Record

N/A

III. Change Record

Issue	Date	Changes	TC issue
Issue 01	05 December 2008	Initial Issue	05 December 2008
Issue 02	10 July 2017	Spey 506-14, -14A,-14D, Spey 511-14W and Spey 512-14DW,-14DWE engine models are deleted on request of the TC-holder .	10 July 2017

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